

MODIS Team Meeting Minutes

Minutes of the MODIS Team Meeting held on Tuesday December 7, 1993.

14 MKM

Action Items:

70. Evaluate the thermal design of the Schaeffer Magnetics' motor/encoder. Assigned to Daelemans 8/31/93. Due 10/15/93
73. Complete the MODIS brochure and released for printing. Assigned to Bauernschub 10/18/93. Due 11/15/93.
74. Prepare and submit a Configuration Change Request which revises the definition and impact of levels of software criticality for the MODIS Software Management Requirements Document. Assigned to Anderson 10/26/93. Due 12/ 1/93
75. Determine if the four electronic module boxes can be individually thermal tested in air, or must the thermal testing be done in a vacuum. Assigned to Silva 10/26/93. Due 11/ 9/93
76. Provide a schedule of the SBRC internal CDRs. Assigned to Bauernschub 10/27/93. Due 11/23/93
CLOSED 12/14/93
78. Recommend details of agreement with SBRC for GSFC access to near-real-time test data. Assigned to Montgomery 11/16/93. Due 12/ 7/93.
79. Consider advisability of bringing bad Readout ICs to GSFC for electrical tests or destructive physical analysis. Assigned to Bob Martineau 11/23/93. Due 12/ 7/93
80. Determine what post-Software Acceptance Review (SWAR) tests need to be done to prepare MODIS for operations during the early on-orbit instrument checkout using macros. This involves determining the following:
 - 1.) Who at SBRC is responsible for generating and testing these macros?
 - 2.) When will this work on these macros be started?
 - 3.) When will these macros be defined?
 - 4.) When will these macros be tested?

Assigned to Guenther 11/16/93. Due 12/7/93.

81. Determine use of on-board calibrators during testing and on-orbit. This is a lifetime issue involving motors, diffuser degradation due to exposure to sunlight, and use of calibration bulbs. Assigned to Guenther 11/23/93. Due 12/14/93.
82. Work with the MODIS team to obtain a consensus on a revised MODIS crosstalk specification and provide inputs for a Configuration Change Request. Assigned to Ed Knight 12/14/93. Due 1/11/94

The following items were distributed:

- 1) Weekly Status Report #117
- 2) SBRC Memos submission from week #109
- 3) Minutes of the last team meeting

Attendees:

✓ Dick Weber	Bruce Guenther	June Tveekrem
✓ John Bauernschub	✓ George Daelemans	Bob Martineau
Rosemary Vail	John Barker	✓ Bob Silva
Lisa Shears	Joann Harnden	Ken Brown
✓ Mike Roberto	✓ Patricia Weir	✓ Robert Kiwak
✓ Nelson Ferragut	Mitch Davis	✓ Harvey Safren
✓ Gene Waluschka	Jack Ellis	✓ Ed Knight
Kate Forrest	✓ Ken Anderson	Harry Montgomery
Bill Barnes	✓ Rick Sabatino	Marvin Maxwell
Les Thompson	✓ Cherie Congedo	Bill Mocarsky

Team Meeting and Other Topics

December 14, 1993

General

The QMR will be held Thursday, December 16, in building 16, room 125. The technical portion is scheduled from 9:00 am to about 2 pm.

Any additional award fee milestones for the period following the CDR thru April should be E-mailed to Ken by Thursday.

Electronics Box Testing in Air

A teleconference with Dick Julian, Bob Cooley, and Paul Bortfeldt was held on December 14th. GSFC participants included Dick Weber, Ken Anderson, Bob Silva, and Mike Roberto.

Dick Julian indicated that SBRC has never done thermal vacuum testing at the box level. For Landsat VI, T/V testing was done at the system level. Dick indicated many penetrations of a T/V chamber would be needed (1280 for the MEM). He also indicated a meaningful performance test at the box level was very difficult. A meaningful T/V test at the box level is further complicated by the need to have proper temperatures, etc. for items radiatively or conductively coupled to the box. Furthermore, Dick had indicated in a previous conversation that some of the test equipment which will be used for making measurements internal to the boxes in air testing is at this time T/V compatible.

The most significant consideration in air versus T/V is whether or not critical parts track in temperature. Dick Julian says this would be the case for the MODIS electronics. He also indicated a shortage of T/V chambers at SBRC. SBRC would be competing with other programs for the use of T/V chambers. It is possible that testing would have to be done at El Segundo.

Furthermore, Dick indicated only a small advantage to testing in T/V for performance measurements which are now planned at points within a box when testing is done in air.

Paul indicated a thermal analysis for testing in air would have large error bars.

Bob Silva has talked about a special small vacuum chamber which has been used with GOES to test electronics boxes in thermal/vacuum while connected via cabling and feedthrus to the instrument in another thermal vacuum chamber. This configuration allowed very rapid breaking of thermal vacuum, repair as needed, and pumpdown (an hour or so to pump down). Another advantage was keeping the large thermal vacuum chamber from becoming contaminated.

According to Bob, Code 300 would be willing to waive the requirement for thermal vacuum testing in vacuum at the box level if a detailed thermal analysis at the box level was performed and indicated good conductive paths for cooling the electronics thru structure. The temperature range would be increased by +/- 15 degrees C and there would be an increase in the number of test cycles to about 8 to 12.

A good test in T/V at the box level would provide more confidence that the box would perform as required at the system level. However, Dick Julian has indicated many reasons why he believes this testing would be difficult, expensive, and of questionable value for MODIS. At this time, this remains an open issue.

Cracked PC Detectors and Defective Silicon Readouts

Mary Dowler says the defective silicon readouts will be sent to Turner Engineering in Dallas/Fort Worth for Destructive Physical Analysis (DPA). Results are expected in January.

SBRC is willing to send a defective readout to GSFC for DPA. However, they want to include a data package they are preparing which contains analysis, processing concerns associated with the work at Carlsbad, etc.

Mary indicated the weight of the MARS bar in the stainless steel configuration is 4 pounds 5.7 ounces. This includes the weight of the FPA.

Cherie Congedo has talked with Bob Levine about approaches to evaluating allowable stresses in brittle materials. Analysis involves calculating stress distributions, inspection of the failed piece, making measurements of fracture toughness, etc. Often flaws are the determining factor on whether or not the piece will break. The material may need to be polished (difficult on the edges) and closely inspected to assure there are no important flaws or initial cracks.

This points to the difficulty in relating the performance of one brittle part to expected performance of another part. If the same part is initially tested to stress levels substantially above what it will later see and does not crack (assuming the part does not fatigue), then the part should be okay. SBRC is following this approach by temperature cycling the ZnCdTe detector bonded to the sapphire substrate. According to SBRC, this test puts the largest stresses into the detector. Cherie will be looking into the expected ratios of the stresses induced in the PC detectors for the various test and orbital conditions.

Orbit

The Orbit foundry is at 1215 Bordeaux Drive, Sunnyvale, CA 94089. Phone (408) 744-1800, attention Betty Newkirk. The company was founded in 1985 and currently (May 1993) has 125 employees. The facility contains 54,000 square feet. The company has been profitable since 1986, simply operating as a semiconductor manufacturing service. The company doubled its facility size in 1992 and projects a 30% growth rate over the next three years. The company has Foresight multi-project wafer processing service which is available for MOS devices with feature sizes down to 1.2 microns. With Foresight, numerous projects can be run on a single wafer according to a weekly project start schedule. Chip production times with Foresight are four to six weeks. For quality control, the manufacturing line is set up in accordance with Appendix A of Military Manual 38510. Regular quality programs are instituted for all employees. A brochure on the company is available.

STOP Analysis

Cherie Congedo, Neil Therrien, Tom Pagano, and Mike Roberto discussed the time required to complete the STOP analysis. Neil is checking NASTRAN models and Code V sequence files for errors. Any differences between GSFC and SBRC models need to be resolved. The intermediate stage radiator has been shown by Cherie and the GSFC STOP team to be important to the analysis and is being put into SBRC's model.

Thermal

George Daelemans mentioned that according to Bill Harris at JPL, the radiant cooler on the Mars Observer was not checked for performance on the way to Mars. A slow outgassing was done with the door cracked about an inch.

Martin Marietta wants to use Velcro at certain places between instruments to prevent the entry of trapped light.

Science

Ed Knight mentioned the center deviation for band 19 is acceptable to science and a memo will be issued shortly.

Mechanisms

Nelson Ferragut stated the solid lubricants for the bearing life tests have failed.

Optical Design

Error in use of index of refraction for the CdTe lenses was due to an error in the input of the expected temperature value of 20 degrees C. The input was interpreted as 20K.

Software

Rick Sabatino indicated the possibility of splitting the acceptance of the flight software from the GSE software. GSE qualification is required before flight, since the GSE software is used in qualifying the flight software.

Systems Telecon

1. SBRC will look into the amount of moisture the graphite epoxy structure is likely to absorb, moisture versus dimensions, and a comparison with Thematic Mapper. There is a project concern about not monitoring moisture pickup during ground test, etc.
2. SBRC would like to have a spec on the allowable disturbances from the spacecraft at the mounting feet of MODIS. Analysis is being done at GSFC to predict these inputs. It remains a question of whether or not the project can be convinced to make this a requirement. For error budget purposes, SBRC is assuming 10 arc sec disturbance input at the mounting feed from the spacecraft, resulting in 20 arc sec pointing error.
3. The usage of the on-board calibrators needs to be determined to assure there are no lifetime, thermal, or stray light problems.
4. DC restore when the blackbody (BB) is heated needs to be studied. If a new lookup table is needed, then it needs to be determined if there is space for an additional table or if the lookup table for elevated temperature would need to be uploaded. Note time to go from 285K to 315K is about 130 minutes and three time constants for going back to 285K is about 300 minutes. Temperature of BB known to within 0.1K at either temperature. The preferred approach would be to not have to upload new table if BB at elevated temperature.
5. Changing the bandwidth of band #18 to 6 nm would require about one to two man weeks of effort. Effort should not be spent on this unless a request is made by GSFC.
6. The radiometric math model has some SBRC proprietary subprograms which should not be released the MODIS team at GSFC. These inputs are in the program so it can be used at GSFC. Documentation on the program will be provided to GSFC. There will be a more limited distribution of the source code. There is the question about modification of the contract.

7. The System Electronic Crosstalk and Pattern Noise paragraph of the MODIS spec (3.4.5.3.3) "excludes those crosstalk effects associated with photo generated charge diffusing through the bulk of the detector material... ' It may be difficult or impossible for SBRC to demonstrate that the requirements of this paragraph have been met. Tom Pagano will recommend a change to the specification so that the transient response spec includes ghosting and detector crosstalk along and cross track. The pattern noise would be included in radiometric testing.

8. SBRC is reopening risk item 008. This is to address changes in the radiative cooler when radiative cooled versus bench test cooled. See STOP analysis, above.

Mike Roberto December 15, 1993

